Capability Gap Brief

MAGTF Electronic Warfare

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1 Mar 2007

FMID Gap Listing

FMID IDENTIFIED GAP	Priority
Unmanned Aircraft Systems	1
Assault Support	2
Target Acquisition	3
Counterfire / Targeting	4
Fire Support Coordination	5
Information Operations	6
Personal Equipment	7
Small Arms / Crew-Served	8
Mobility / Counter-Mobility	9
Rockets / Artillery	10
Riverine / Special Operations	11
Public Affairs	12
Offensive Air Support	13
Electronic Warfare	14
Civil Affairs	15
Offensive Anti-Air Warfare	16

FNA Results: FMID

G – Gap, E – Excess, S – Shortfall, N - NA

Highest Pri JCA supported and total number	*FMID Section/* **# MCTL tasks**	Description of Capability Gap by FMID section across applicable tasks	FMID Pri	G/E/ S/N	Gap Mitigation	
					POM-10	Beyond
Global Posture/ **15 JCA's supported**	*Electronic Warfare/* ***Supports 25 of 49 FMID FAA tasks***	**Emerging capability gap in expeditionary EW. No comprehensive MAGTF EW capability defined. End strength increase will amplify EW capability gaps.**	14	G		

Capability Analyzed
Electronic Warfare

15 JCA's supported: Hi Pri Global Posture
25 MCT's supported : Hi Pri ASSESS/Conduct Combat Assessment
Deficiencies in Conditions: Unable to provide AEW support to MAGTF (2015-2020?); Insufficient MAGTF ground EA
Deficiencies in Standards: Joint & MAGTF EW capability severely degraded.
Possible DOTMLPF Implications: DOTMLPF (see below)

Gap, Excess, or Shortfall

D	**Require changes to support MAGTF EW 2020 operational concepts**
O	**Gap caused by continued separation of USMC Air/Ground EW communities; Lack Cadre of EW Marines at all levels; EW MOS?**
T	**Possible USMC EA-6B FRS Required; integrate EW training at all levels**
M	**Gap in AEW 2015-2020(?); Gap in ground based EA (see UUNS 07005UB)**
L	**No USMC EW Advocate/Proponency**
P	**May require add'l personnel for structure changes**
F	**May require add'l EW ranges**

Inputs utilized for analysis:

- MAGTF FAA dtd Jun 2006
- Marine Corps Midrange Threat Estimate: 2005-2015
- Joint EW Roadmap version 0.0
- Concept for MAGTF EW 2020 (Draft)
- Current Funding Data: POM-08 and Supplemental
- USMC Lessons Learned Database
- UUNS 07005UB Terminal Guidance/Denial of Service

Current PORS

- EA-6B ICAP II / III (End of Service 2015)
- CESAS (Communication Emitter Sensor and Attack System): Radio Battalion vehicle-mounted, shelterized, SIGINT/EW system.
- TCAC (Technical Control and Analysis Center) vehicle-mounted, shelterized, computer-based SIGINT/EW fusion center. Provides automated capability for SIGINT processing, analysis, and reporting functions.

Supporting Element PORs : N/A

Description of Capability Gap

- Emerging capability gap in expeditionary AEW
  - Joint/USMC gap resulting from scheduled 2015 sundown of EA-6B
  - No follow-on capability identified

- Insufficient MAGTF ground EA
  - UUNS 07005UB Terminal Guidance/Denial of Service
  - RADBn Briefed By IID

- No comprehensive MAGTF EW capability defined
  - No single USMC EW community/advocate to provide direction or give voice to USMC capability
  - No integrated unity of effort or operating concept among disparate USMC EW capabilities (VMAQ, RadBn, FP, Intel, etc.)

Impact on the MAGTF

"The U.S. military predominates in traditional forms of warfare. Potential adversaries accordingly shift away from challenging the United States through traditional military action and adopt asymmetric capabilities and methods. An array of traditional, irregular, catastrophic, and disruptive capabilities and methods threaten U.S. interests."

- Office of the Secretary of Defense,

National Defense Strategy

Impact on the MAGTF

- Increasing demands due to trends in commercial technology and innovative means of employing these technologies, point toward the need for a future force capable of dominating the EM spectrum in all phases and spectrums of conflict.
- Current MAGTF AEW systems are approaching obsolescence
- Ground EW challenged to keep up with proliferation of COTS technology
- Ever expanding target/threat set

Impact on the MAGTF

Current Target Set	Future Target Set
C2 Nets	Current Targets +
RF SAMs	C4I
Communication Networks	Wireless Networks
RCIED's	Position, Navigation, and Timing
Media	Fuzed Projectiles
Computer Networks	Robotics
	UAVs
	Infra-Red Systems

Threat/Target Evolution

- Enemies will continue to expand their use of the EM spectrum to generate effects using:
  - R*f* SAMs
  - Fused projectiles
  - Communications
  - RCIED's
  - Robotics
  - UAVs
  - Sensors (attended/unattended)
  - Psyop/propaganda
  - PNT
  - Jammers

National Defense Strategy Threats: Traditional, Irregular, Catastrophic, and Disruptive capabilities and methods

Strategic Planning Guidance of Airborne Electronic Attack: *"full spectrum electronic attack capability… to include the expanding AEA target set"*

Targets and threats as identified by the **SPG**, **DoD EW and IO Roadmaps**, **STRATCOM Operational Concept for EW**, and (draft) **MAGTF EW Concept 2020**

- Fueled by the ***commercial electronic*** industry, the effects the enemy can generate will continue to outpace US EW capabilities from irregular through conventional.

To counter (let alone dominate) this growing spectrum of conflict, and given aging legacy AEA capability (and atrophied Joint AEA programs), USMC EW community must be agile and responsive with real capabilities.

UNCLASS/PREDECISIONAL/FOUO

Present and Future EW Battlespace

COTS | Lethal | Mobile | Prolific | Chaotic | Accessible
Intense | De-centralized | Networked | Austere

Broadcast and Print Media

GPS

Telephone Landlines

FRS/PMR (consumer handheld radios)

Taskable Satellites

Civilian Infrastructure

Consumer/Commercial Systems

Military/Government Systems

Airborne C3

Gov't Centers

GSM Networks

Religious/Civil Facilities

Long Range Cordless Telephones

Cell Phones

Civil/Police FM

Satellite Phones

Tactical Aircraft

Weapons Emplacements

Capability varies with resources

Internet (Wired/Wireless)

Frequency Hoppers

Encryption

Military Handheld

Mobile Data/Comms

Enemy sophistication and resources

Criminal/Asymmetric ----------Insurgent/Militia----------State Actor

EW in Support of MAGTF Operations

- Information Operations (IO):
  - Counter adversarial C2, to include overt/covert intrusion on networks and systems
  - Deliver PSYOP themes and messages
  - Deliver CNO effects
- Counter C2:
  - Locate, deny, categorize, and exploit adversarial communications across the RF spectrum
  - Denial can take the form of electronic attack (EA) or physical destruction.
  - Attack selected signals, often buried within blue force bandwidth, while leaving the remainder of the communications infrastructure available for friendly or neutral use. (See UUNS 07005UB Terminal Guidance/Denial of Service)

EW in Support of MAGTF Operations

- SEAD:
  - Suppress tactical, mobile radar and surface-to-air missiles (SAM) operating throughout the EM spectrum and across the battle space.
  - CNO, PSYOP, and counter-C2 in support of SEAD
  - Without airborne EW, higher risk is assumed vs. IADS
- Force Protection:
  - Provide Indications and Warnings
  - Reduce adversary situational awareness by denying, degrading, or disrupting sensors and C2 links
  - Neutralize threats to personnel, facilities, or the electromagnetic spectrum via ground, sea, air, or space-based systems
  - Reduce vulnerability of MAGTF systems to exploitation and denial through the employment of embedded electronic protection features, such as low-probability of intercept (LPI) or anti-jam (AJ) features

EW in Support of MAGTF Operations

- Non-kinetic Force Application:
  - Limit collateral damage and unnecessary loss of life.
  - Influence conflict escalation and campaign timelines
  - Reduce kinetic munitions expenditures and associated logistics tails
  - Reduce post-hostilities reconstruction efforts (time and money) resulting from kinetic strikes
  - Exploitation or denial of adversary capabilities

- Battlespace Awareness:
  - Collect and automatically share data/information in a format that is compatible with COP databases and C4I links
  - Characterize enemy actions and locations while remaining passive
  - Identify specific units, platforms or systems based on their electronic emissions (fingerprint)

Description of Capability Gap

- Emerging capability gap in expeditionary AEW
  - Joint/USMC gap resulting from scheduled 2015 sundown of EA-6B
  - No follow-on capability identified

- Insufficient MAGTF ground EA
  - UUNS 07005UB Terminal Guidance/Denial of Service
  - RADBn Briefed By IID

- No comprehensive MAGTF EW capability defined
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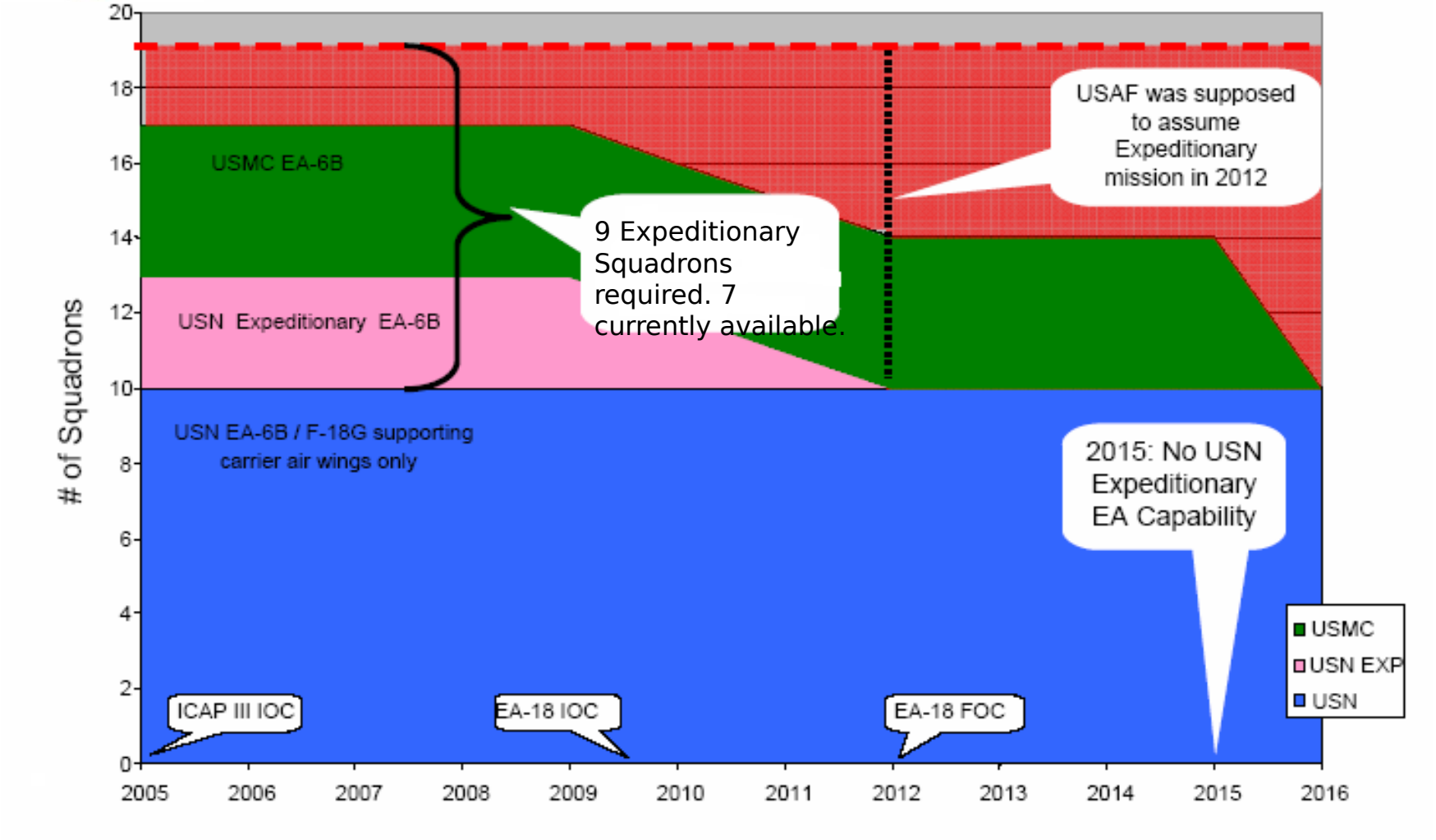
Emerging capability gap in expeditionary AEW

- USAF cut the B-52 Stand-Off Jammer (SOJ) and EW Unmanned Combat Air Vehicle (UCAV) and will be unable to assume the expeditionary AEW mission as scheduled in 2012
- 2012 USN replaces EA-6B with the EA-18G with no plans to maintain expeditionary EA-18G squadrons
- 2012 USMC becomes sole possessor of expeditionary AEW capabilities and sole operator of EA-6B
- 2015 USMC sundowns the EA-6B
- **2015-2020 Gap in USMC/DoD Expeditionary AEW**

Developing Joint Capability Gap



Developing USMC Capability Gap

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
EA-6B ICAP-II Sqdn	4	4	3	3	2	1	1	0	0	0	0
EA-6B ICAP-III Sqdn			1	1	2	3	3	3	3	2	1
INREPID TIGER	2	2	2	2	2	2	2	1	0	0	0
JSF Sqdn							2	4	5	7	9
UAV EW (det)	FUE	0.1	0.5	0.5	SDD	SDD	SDD	SDD	1	2	4
CESAS/V5	TBD	2/2	20	20	20	20	20	20	20	20	20
CREW	?	?	?	?	?	?	?	?	?	?	?

AEW gap between EA-6B sundown and JSF FOC

Description of Capability Gap

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- Insufficient MAGTF ground EA
  - See UUNS 07005UB Terminal Guidance/Denial of Service
  - Briefed By IID (?)

- No comprehensive MAGTF EW capability defined
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Description of Capability Gap

"In order to control the EM spectrum, the 21st century MAGTF must possess organic, ground and airborne EW assets *seamlessly integrated*, yet capable of stand-alone operations. MAGTF EW must also be capable of leveraging joint assets that will span the air, ground and space control domains. This EW capability must provide the MAGTF commander a variety of tools to achieve the information superiority required to accomplish the mission, and to prevent losses attributable to an adversary's use of the RF spectrum."

- *Concept for MAGTF EW 2020 (Draft)*

Where are we now?

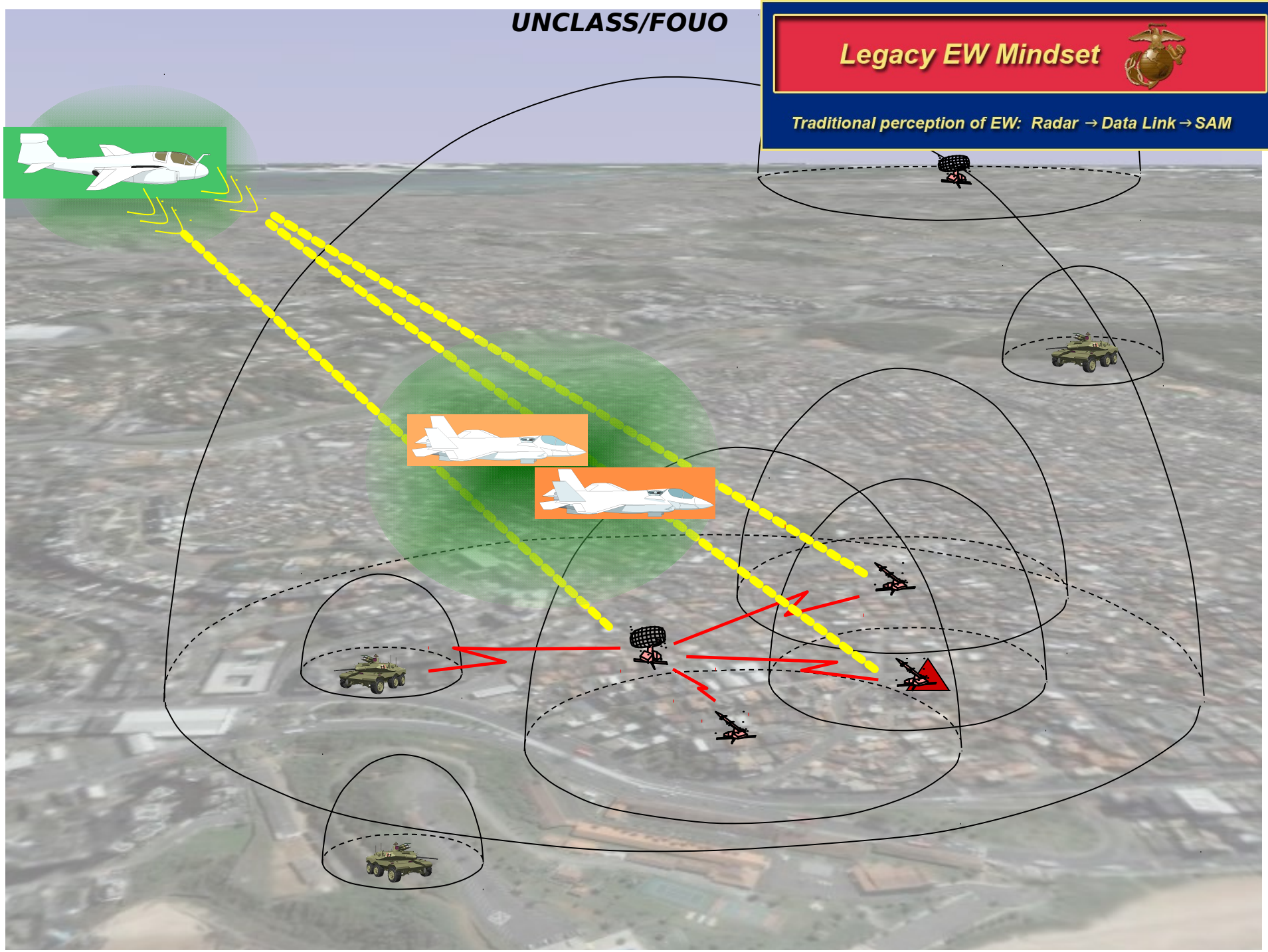
- Not integrated or compatible
  - On a USMC or joint level
- Not modular or scalable
  - Getting better here
- Limited Quantities
  - Worse when EA-6B retires
- Not keeping pace w/ technology changes
  - Target set grows faster than solution set
- Most Important – Obsolete in 10 years?!

Current Target Set
C2 Nets
RF SAMs
Comm Networks
RCIEDs
Media
Computer Networks

UNCLASS/FOUO

Legacy EW Mindset

Traditional perception of EW: Radar → Data Link → SAM



Where are we going?

In order to control the EM spectrum, the 21st century MAGTF must possess *organic, ground and airborne EW assets seamlessly integrated, yet capable of stand-alone operations.* MAGTF EW must also be capable of leveraging joint assets that will span the air, ground and space control domains. This EW capability must provide the MAGTF commander *a variety of tools to achieve the information superiority required to accomplish the mission, and to prevent losses attributable to an adversary's use of the RF spectrum.*

Future Target Set
Current Tgt Set +
C4I
Wireless Networks
PNT
Fuzed Projectiles
Robotics
UAVs
Infra red systems

Must have the following attributes:

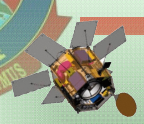
- Organic
- Modular and Scalable
- Networked
- Integrated and Compatible
- Open architecture
- Tactically reprogrammable
- Diverse
- Upgradeable

2020 USMC MAGTF EW

Robust | Lethal | Scalable | High-Power | Highly-Sensitive
Integrated | Organic | Knowledge-Based | Modular

Strategic

Satellites

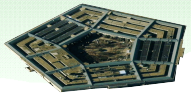


Manned Platforms

UAV's

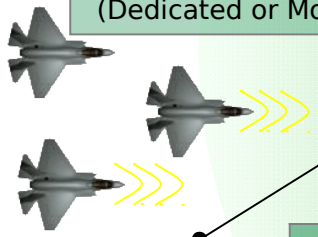
Global Information Grid

Instant Reachback



Tactical

Offensive Jammers (Dedicated or Modular)



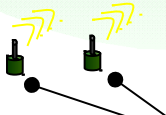
Small, organic UAV's

Electronic Surveillance

Battle Management/ All-Source Fusion Center

Unmanned Vehicles/Robots

Offensive and Self-Protect Jammers (Ground-Based)



Unattended, autonomous EW networks

Personal

Emergency Locator

RF Sensors

Networked Digital Radio (Data/Voice

Networked Situational Awareness And Targeting

Self-Protect Jammer

Every Marine and vehicle is a node. Every node adapts to available spectrum.

Key Attributes Needed to Resolve the Gap

- Equipment will be deployable, sustainable, modular, networked, jointly interoperable, re-programmable, and diverse (spanning the battlespace from ground, air, space and from stand-off to covert stand-in components), within an open architecture.

- EW architecture must be fully integrated, supporting the (COP). Information must flow from organic and joint assets directly to the tactical fusion center (TFC) for rapid processing and dissemination.

- Tasking must be responsive, real-time, prioritized and cooperative in order to achieve the synergy required to maximize the effectiveness of available EW assets.

New or Current Capability Issues

- Gap developed as a result of
  - An evolving threat – proliferation of COTS technology
  - Obsolescence of existing capabilities – ICAP-II, RadBn
  - Delay in delivery of future capabilities – JSF, EWUAS, CESAS
  - Roles and missions of EW communities merging

- Is there a similar/duplicative gap being analyzed? No

- Is the basic capability MC unique? No

  - USN currently operates EA-6B ICAP II and is transitioning to ICAP III with plans to replace the EA-6B with the EA-18G in 2012.
  - USA operates robust SIGINT capability

New or Current Capability Issues

Service	Capability	G/S	Initiatives
USAF	- EC-130 - RC-135 - F-16CJ - Self Protect	- No tactical EAEW (**G**) - Min EW Spt JFLCC (**S**)	- Mix Pods/UASs to provide CIADS & CC2
USA	-Expanding CREW Capability -SIGINT	- No tactical EAEW (**G**) - Min EW expertise (**S**) - No Doctrine (**G**)	- UAS/RW - Developments across DOTMLPF
USN	- EP-3E - EA-6B - Fleet Defense - Self protect - Escort AEW	- No tactical EAEW beyond 2012 (**G**)	- EA-18G: **Not planned to be expeditionary** - UASs

IID Integration Concerns

Gap #	JCA	MCTL/***IID Section***	Description of Capability Gap by Task	G/E/ S/N	Gap Mitigation	
					POM-10	Beyond
1	**4.5.2.0 Intelligence Architecture Development** **7.0.0.0 Joint Protection** **9.3.0.0 Conduct Decisive Maneuver** **14.0.0.0 Joint Special Operations and Irregular Warfare** **14.2.0.0 Direct Action** **14.4.0.0 Unconventional Warfare**	**2.1 Plan and direct Intelligence Operations** **2.1.1.5 Support targeting**	**Limited ability to rapidly disseminate actionable intelligence and relevant products, to include sensor to shooter Near Real Time (NRT) data to the lower tactical levels (BN and below).**	S	**X**	
2	**4.2.0.0 Observation and Collection (All Domains)**	**2.2 Collect data and intelligence**	**Limited ability to establish and maintain a persistent, multi-sensor collection architecture to enable a covert, "unblinking eye" view within a defined battlespace.**	S	**X**	
	5.3.1.0 Access and Share Intelligence Information and Forecasts	**2.1 Plan and direct intelligence operations** **2.4 Produce Intelligence**	**Limited ISR data visibility and accessibility and database synchronization between USMC units/ organizations, other Services, Theater**	S	**X**	

IID Integration Concerns

Gap #	JCA	MCTL/***IID Section***	Description of Capability Gap by Task	G/E/ S/N	Gap Mitigation	
					POM-10	Beyond
4	**14.4.0.0 Unconventional Warfare**	**2.2 Collect data and intelligence**	**Limited ability to collect on rapidly changing threat signals of interest – refer to the following Joint Worldwide Intelligence Communication System (JWICS) http://www.itsfac.mci a.ic.gov/MCISR-E**	S	**X**	
7	**4.4.4.0 Intelligence Preparation of the Environment** **8.0.0.0 Joint Logistics**	**2.2 Collect data and intelligence**	**Limited ability to collect in restricted (urban, subterranean), terrain through camouflage, and in all weather conditions.**	S	**X**	
8	**14.0.0.0 Joint Special Operations and Irregular Warfare**	**2.2 Collect data and intelligence**	**Inability to remotely collect inside buildings or through walls on convention/ non-conventional threat force personnel.**	G	**X**	

FPID Integration Concerns

JCA Pri	JCA	MCTL	Description of Capability Gap by Task	G/E/ S/N	Gap Mitigation	
					POM-10	Beyond
5	**Joint Information Operations**	**2.2.1**	**Electronic Warfare and Neutralization of IEDs**	S	**X**	
6	**Joint Protection**	**5.1.3.1, 6, 6.1, 6.1.1.7, 6.1.1.8, 6.1.1.9.3**	**Anti Air Warfare. Present system is unable to defend against, identify, detect or track cruise missiles, UAV's and other low RCS targets**	G		**X**
9	**Joint Protection**	**MCT (9): 1.6.6.1, 6.1.1.3, 6.1.1.3.5, 6.1.1.4.2, 1.6.6.1, 5.3.3.3, 6.1.1.5, 6.1.1.4, 6.1.1.2.1**	**Impede Movement, Counter-Personnel: Unable to adequately deny/defend area or delay personnel using NL means.**	G	**X**	
	Joint Protection	**MCT (13 total): 6.1, 6.1.1, 6.1.1.4.2,**	**Disable, Counter-Materiel: Unable to render vehicles inoperable using non-**			

Doctrine/OTLPFM Impacts

- **Doctrine: Requires changes to support MAGTF EW 2020 operational concepts**
  - What published doctrine addresses the capability?
    - JP 3-51 Joint Doctrine for Electronic Warfare 7 April 2000
      - MCWP 3-40.5 Electronic Warfare 10 Sep 2002 (In review)
      - MCWP 2-22 Signals Intelligence Feb 1999 (In review)
  - What doctrinal changes result from new/enhanced capabilities being introduced to mitigate this gap?
    - EW doctrine must be changed to reflect evolving definitions, missions, organizations and relationships within MAGTF EW. These changes will formalize the Operating Concept and provide the synergy required to control the EM spectrum.

D/Oorganization/TLPFM Impacts

- **Organization: Separation of USMC Air/Ground EW communities; Lack Cadre of EW Marines at all levels; EW MOS?**
  - Assumptions: organizational change issues limited to minor adjustments within existing force structure.
  - What organizational changes, if any, will eliminate or mitigate the capability gap?
    - Organizational changes are not required.
    - USMC must fill existing EW billets throughout the fleet. This will be the first step in ensuring EW expertise is available to the MAGTF at all times.

DO/Training/LPFM Impacts

- **Training: Possible USMC EA-6B FRS Required; integrate EW training at all levels**
  - How could training be modified or provided to mitigate or eliminate the gap?
    - USMC EA-6B FRS may be required following USN sundown 2012
    - Coordinated training and mutual cooperation must be established throughout USMC EW communities to ensure unified experience, planning and execution among capabilities.
    - EW must be integrated into all MAGTF training evolutions to expose all Marines to the benefits of MAGTF EW and the vulnerability of MAGTF systems to enemy EW.
  - What training requirements are identified for the fielding of new equipment?
    - None required
  - Who can provide the required training?
    - Curriculum changes in existing courses will provide needed training. No additional courses required.

DOT/Leadership/PFM Impacts

Leadership and Education: No USMC EW Advocate/Proponency

- Can leadership decisions mitigate gap?
  - Partially: Establishing a USMC EW advocate will provide centralized leadership responsible for unifying the various USMC EW communities. This unity will lead to a much more responsive and effective EW capability.

- Is leadership experience/change required to meet or mitigate gap?
  - Partially: MAGTF leaders must be exposed to EW until its use becomes second nature. Leaders within the EW communities must strive to break down inter-community barriers and unite USMC EW capabilities in order to develop synergy.

DOTL/Personnel/FM Impacts

- Personnel: May require additional personnel for structure changes
  - Describe personnel changes which can be done to eliminate gap?
    - Ensure existing EW billets are filled throughout USMC
  - Can MOS realignment mitigate the gap?
    - None required
- Facilities: May require additional EW ranges
  - As EW capabilities grow in response to evolving requirements, EW ranges may need to be created to support training in newly developed TTPs. (CIED, Counter C2, CNO, etc)

DOTLPF/Materiel Impacts

- **Materiel: Materiel requirements in EW**
  - Are there current materiel solutions available to mitigate the capability gap?
    - Yes - IOT bridge the MAGTF expeditionary AEW gap USMC can maintain EA-6B until follow-on capabilities are fielded.
      - Procure additional 8 ICAP III (20 FAA)
      - Extend EA-6B until JSF/UAS capability is FOC (2020-2024)
      - Require NEXGEN Jammer to be multi-platform (EA-6B, EF/A-18G, JSF), open architecture, Plug & Play
  - Are there any current service/joint solutions available which meets the requested capability?
    - Yes - USN operates EA-6B and can employ EA-18G (FOC 2012) in expeditionary role.
    - Is MC participating in another service's program? No
    - Is the MC developing a solution that is independent of other services?
      - Yes - USMC solution may lead to MAGTF being sole provider of Expeditionary Tactical AEW (EA-6B)

DOTLPF/Materiel Impacts

- **Materiel: Materiel requirements in EW**
  - If recommended solution is a material solution describe DOTMLPF implications.

D	**None**
O	**Possible FRS solution after 2012**
T	**Possible FRS solution after 2012**
M	**Acquire 8 additional ICAP-III; $88M**
L	**None**
P	**Possible FRS personnel requirements after 2012**
F	**Possible FRS facility requirements after 2012**

DOTLPF/Materiel Impacts

- **Materiel: Gap in ground based EA (see UUNS 07005UB)**
  - **Are there current materiel solutions available to mitigate the capability gap?**
    - **If “yes”, describe the recommended solution.**
    - **If “no”, description materiel solution that will provide the needed capability.**
  - **Are there any current service/joint solutions available which meets the requested capability? If yes explain.**
    - **Is MC participating in another service’s program?**
    - **Is the MC developing a solution that is independent of other services?**
  - **If new start describe recommended solutions.**
    - **Is technology available/unavailable?**
  - **If recommended solution is a material solution describe DOTMLPF implications.**

Possible Solutions
Non-Materiel/Materiel

USMC bridges Airborne Electronic Warfare (AEW) gap 2015 – 2020:

- Postpone sundown of EA-6B until JSF/NEXGEN JX is FOC
- Purchase 8 additional EA-6B ICAP III to fill USMC required FAA of 23 A/C
- Insure NEXGEN JX is Plug & Play (EA-6B, EA-18G, JSF)
- Continue to pursue AEW/UAS

Possible Solutions
Non-Materiel/Materiel

USMC unites existing EW communities into a unified MAGTF EW capability through doctrinal changes, operational concepts, education and common TTPs.

- Sign Concept for MAGTF EW 2020
- Eliminate cultural intra-community barriers through re-defining MAGTF EW
- Establish a USMC EW proponent (MCIOC)
- Develop MAGTF EW COP
- Re-evaluate the EWCC

Recommendation

- USMC bridges AEW gap by postponing sundown of EA-6B until JSF/NEXGEN JX is FOC.
- USMC unites existing EW communities into a unified MAGTF EW capability through doctrinal changes, operational concepts, education and common TTPs.
- Sign & Release Concept for MAGTF EW 2020